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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/730,246	12/05/2000	Jathan D. Edwards	53868US02	7896

7590 10/27/2003

Attention: Eric D. Levinson  
Imation Corp.  
Legal Affairs  
P.O. Box 64898  
St. Paul, MN 55164-0898

EXAMINER
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ANGEBRANDT, MARTIN J

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 10/27/2003

14

Please find below and/or attached an Office communication concerning this application or proceeding.

A2-14

<b>Office Action Summary</b>	Application No.		Applicant(s)	
	09/730,246		EDWARDS, JATHAN D.	
	Examiner		Art Unit	
	Martin J Angebrannt		1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 August 2003.
- 2a) ☒ This action is FINAL.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 35-55 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 35-55 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

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|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other:  |

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1. The response of the applicant has been read and given careful consideration. The examiner appreciates the copy of the translation of JP 01-023440 supplied by the applicant. The 112 rejection are obviated by the arguments of the applicant. The indication on page 2 of 1.6 times the spot size as a point in the specification is sufficient to address the rejection of the previous office action, although it talks about widths greater than 1.6 times the wavelength.

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 36-42, 45-47, 50-52 and 54-55 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Sugimoto JP 01-023440 (aka JP 64-023440).

Sugimoto JP 01-023440 teaches with respect to figure 1, laser exposure of a resist, development, formation of a stamper and formation of a polycarbonate substrate using the stamper. The grooves formed by the laser exposure are wider than the remaining areas of resist as shown in figure 1c. On page 3, the groove formed on the photosensitive master is 1.1 microns wide and the pitch is 1.6 microns. (page 3, upper left column). 1.6 (pitch) divided by 1.1 (groove width) is 1.45, which is less than 1.6.

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Describing the prior art (figure 4), a first (4d,4e) and second (4f,4g) stamper are formed, and then the substrate (4h) is formed from the second stamper. The reproduction characteristics of the media are disclosed in the upper right hand column of page 3.

Please note the resolution of the exposure (NA-0.93) on page 2 in the lower left column.

The claims are directed to the formation of the pattern in the photoresist of the master. The language concerning a replica is considered intended use until actively recited. The examiner notes that only grooves and lands need to be formed and that either conformation (direct or inverse) could be used as the substrate. With the width of the grooves being 1.1 microns and the thickness of the resist on the order of a micron or less, then examiner holds that the width of the substrate exposed is more than 0.8 microns.

The applicant is quite correct that the width of the groove and the spot size of the laser are not the same, but these are related. The arguments of the applicant fail to account for the use of defocusing of the laser beam in the reference (see page 4 of the translation describing the process conditions according to the invention). Among these is that only a single pass of the laser is disclosed, the 0.57 value for  $k$  assumed by the applicant does not apply between optical systems merely due to the use of similar lasers, the high laser power used (5.7 mW vs 3.0 mW), the use of defocusing and the sensitivity of the photoresist. The formula appearing on page 1 of the instant specification and relied upon by the applicant relates to the diffraction limit of the focus only for a particular system. It does not address defocused situations such as that used in the reference. The diameter of the beam will be larger than the groove formed in the resist due primarily to the sensitivity of the resist. The wings (edges of the (Gaussian) beam)

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will not have sufficient intensity to expose the resist and the width of the groove is likely measured at  $\frac{1}{2}$  height, not the top. The top of the groove will be wider and the bottom narrower due to the approximately Gaussian intensity distribution of the laser beam (for gas lasers, such as argon ion and HeCd operating in TEM00 mode). Therefore the laser spot size is at least the width of the groove due to the single pass and due to the sensitivity of the resist and the lower intensity of the laser at the edges of the beam, likely somewhat wider. In the reference the groove is 1.1 microns and the pitch is 1.6. Even assuming the best case for the applicant's argued position (the laser being the same width as the groove), the laser is 1.45 times the pitch of the tracking grooves, which meets the limitation of the claims. The problem with the current claims language is that it fails to account for duty cycles in the pitch that are less than 0.5 (ie. cases where the grooves and lands are different widths) and where the dimensions of the lands and grooves are relatively large.

With respect to the issue of intended use. The preamble is directed to "laser etching a photosensitive master to form a master pattern that is the inverse of a **desired replica pattern**", also such as pattern will have a track pitch less than 2 times the spot size of the laser. The process does not actively recite a step for producing the replica, only what it might be. In the case of optical recording media recording may be performed in the grooves and/or on the lands and either the same polarity image or the inverse would be useful. The applicant has not added the step of forming the replica, preferring to stop with the master. Therefore the examiner holds that the step of forming the replica is not required to be shown to meet the claim, but the master has to meet the structural limitation so that an inverse master meeting the limitation of the claims could be

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formed from it. Therefore this is considered an intended use limitation as the actual step of forming the inverse replica is not recited. With respect to the flatness, the examiner notes that the development of the resist is shown in the figure 1c to proceed down to the substrate surface, which is flat. The rejection stands.

5. Claims 36-43,44-52 and 54-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugimoto JP 01-023440, in view of Kashiwagi et al. EP 0418897 and Folger et al. '978.

Kashiwagi et al. EP 0418897 teaches the size of the grooves is limited by the ability to decrease the spot diameter of the laser beam and that this is limited by the numerical aperture and the wavelength of the laser light (1/24-42). To reduce the size of the grooves, the photoresist is exposed and developed to produce a groove of a certain width ( $W_1$ ) and then etching is performed to produce grooves of a smaller width ( $W_3$ ) in an intermediate layer. (figures 1c & 1d). A stamper (9,10) is made from this surface and used to form a second stamper (11) and a third stamper (12), which is then used to produce a optical disk substrate with wide lands and a narrow groove.

Folger et al. '978 teaches the formation of optical devices (phase gratings) where the first and second generation copies are formed using a cast resin. (6/42-7/28 and 7/29-8/35) Subsequent replicas useful in stamping are formed through electrodeposition/electroforming and the metal separates easily from the plastic (8/60-61) The passivation of the nickel surface with dichromate to allow another nickel master to be formed thereon, but allowing for easy removal is disclosed. (8/36-9/5). Note that both odd and even duplicates are used to stamp the desired images. It is just a matter of polarity of the original relative to the desired article.

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It would have been obvious to modify the process of Sugimoto JP 01-023440 by forming a second stamper and then the optical disk substrate to produce the high density optical recording media substrates of Kashiwagi et al. EP 0418897 without the need for the etching step with a reasonable expectation of success as the number of techniques is reduced and the teachings of Folger et al. '978 concerning the use of either odd or even numbered stampers to form substrate in the polymeric material.

The rejection stands for the reasons above without further comment.

6. Claims 36-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugimoto JP 01-023440, in view of Kashiwagi et al. EP 0418897 and Folger et al. '978 combined with Daecher et al. '829.

Daecher et al. '829 teach the width and pitch of the spiral groove formed in the substrate may be 0.1-10 microns dependent upon the particular medium.

In addition to the basis provided above, the examiner holds that it would have been obvious to use modify the invention of Sugimoto JP 01-023440, in view of Kashiwagi et al. EP 0418897 and Folger et al. '978 for higher density media by decreasing the pitch of the media (thereby increasing the number of tracks and the amount of data able to be stored) by reducing the pitch within the ranges taught by Daecher et al. '829 to gain the advantage of increased storage capacity.

7 The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Nakane '139 (1/22-46), Takamizawa et al. '587 (4/58-5/10) and Seong '288 (3/20-43) all discuss the diffraction limited spot size for lasers in optical recording media.

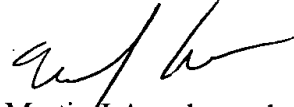
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8 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J Angebranndt whose telephone number is 703-308-4397. The examiner can normally be reached on Mondays-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 703-308-2464. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

  
Martin J Angebranndt  
Primary Examiner  
Art Unit 1756

October 23, 2003